

PATENT ABSTRACTS OF JAPAN

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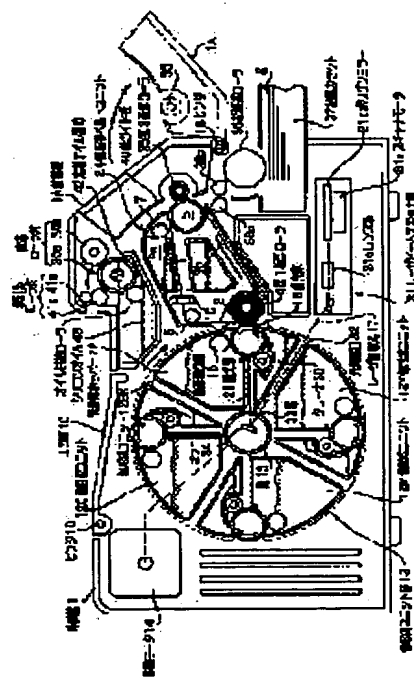
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(57)Abstract:

PROBLEM TO BE SOLVED: To make the constitution of an intermediate transfer part compact and simple and to improve maintainability by providing an opening/closing part constituted to open a part of a recording paper traveling path to remove jammed paper when it is opened.

SOLUTION: A printer front plate 1A is freely operated so that it is tilted and opened centering a hinge 1B on a lower side with respect to the outside housing 1 of a printer as shown by an alternate long and two short dashes line and operated so that it is raised and closed as shown by a solid line. Attaching/detaching operation of an intermediate transfer belt unit 2 inside the printer and the inspection and maintenance of the inside of the printer at the time of paper jamming, etc., are performed by tilting and opening the plate 1A and largely opening the inside of the printer. The attaching/detaching operation of the unit 2 is designed to be performed in a perpendicular direction to the rotary shaft of a photoreceptor. By constituting the unit 2 so that it is drawn out from the front side of the printer in this way, the constitution for attaching/detaching the unit 2 and the constitution for removing paper at the time of paper jamming in the printer are made the same.



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CLAIMS

[Claim(s)]

[Claim 1] Carry out set arrangement in a revolving shaft and the perpendicularly removable condition respectively at the shape of an approximate circle column, and two or more individual units which have opening which supplies the color toner held in the interior to the unit exterior are constituted. And while said opening stops in the condition of being located in the side, in a development location and said opening stops in the condition of being located up, in an exchange location The body of revolution which constituted said individual unit from the closing motion section on the top face of equipment for said opening removable to the shaft and perpendicular direction of said body of revolution in the condition of having turned up, A means by which it is established after imprinting the image formed on the photo conductor with said color toner on the middle imprint object held in the middle imprint unit and imprinting it in a record form further, While being located in said body-of-revolution upper part and laying the record form after color picture fixing The recording paper installation base which makes the closing motion section for individual unit exchange serve a double purpose, and the middle imprint unit hold section held in the revolving shaft and perpendicular direction of said photo conductor possible [a drawer] while arranging said middle imprint unit in an imprint location, It is located ahead [equipment] and is the closing motion section which can be inserted in said photo conductor revolving shaft and perpendicular direction from said middle imprint unit hold section at a cash drawer or said middle imprint unit hold section about said whole middle imprint unit. The closing motion section which opened a part of record form transit path wide, and was constituted possible [paper jam removal] at the time of an open beam is provided. Said middle imprint unit Estranged from said photo conductor to said photo conductor revolving shaft and perpendicular direction, and consisted of the closing motion sections of said front face of equipment removable. The individual unit characterized by being constituted by said body of revolution free [attachment and detachment] where it is the individual unit used for a color picture recording device, it held the color toner in the interior and said opening is turned up.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the individual unit used for a color picture recording device applicable to a color printer, a color copying machine, color facsimile, etc.

[0002]

[Description of the Prior Art] In order to form a color picture with electrophotography generally, the approach of piling up Hierro, a Magenta, cyanogen, and the toner image of each black color on imprint material, and forming a color image is taken. As the formation approach of this color image, the toner image of each color is formed one by one on a single photo conductor. The imprint drum method which imprints in piles the toner image of each color by which is made to rotate the imprint material twisted around the imprint drum, and is made to counter this photo conductor repeatedly, and sequential formation is carried out there, The continuation pile method which the imprint material which arranges two or more image formation sections side by side, and is conveyed by a belt etc. is made to pass through the location of each image formation section, and imprints and piles up the toner image of each color one by one is common.

[0003] The color picture formation equipment shown in JP,1-252982,A is one of the things using the former imprint drum method. Drawing 5 shows the outline of the whole configuration of the conventional example of the above-mentioned imprint drum method, and explains the configuration and actuation briefly below. In drawing 5, 101 is a photo conductor, this is countered and the electrification machine 102, the development section 103, the imprint drum 104, and the cleaner 105 are formed. the development section 103 consists of the Y development counter 106 for building the toner image of the Hierro color, an M development counter 107 for a Magenta color, a C development counter 108 for a cyanogen color, and a Bk development counter 109 for being black, the whole development counter group rotates, and each development counter counters a photo conductor 101 one by one, and will be in the condition in which development is possible. The imprint drum 104 and the photo conductor 101 are rotating with constant speed in the direction of an arrow head, respectively, countering during actuation.

[0004] First, if actuation begins, while a photo conductor 101 will rotate in the direction of an arrow head, the front face is uniformly charged with the electrification vessel 102. Then, photo conductor 101 front face can irradiate the laser beam 110 modulated by the signal for forming the image of Hierro of one amorous glance, and a latent image is formed. Furthermore, this latent image is developed by the Y development counter 106 of Hierro which has countered the photo conductor first, and the toner image of Hierro is formed. When coming to the location where the toner image of formed Hierro counters the imprint drum 104, in the tip, one sheet of form as imprint material sent from the feed section 111 is held by the periphery of the imprint drum 104 by the claw part 112, and is already twisted [by] around it, timing is taken and a toner image is formed so that the toner image of Hierro on a photo conductor may counter and meet with the position of the form.

[0005] After the toner image of Hierro on a photo conductor is imprinted by the form according to an operation of the imprint electrification machine 113, a photo conductor front face is cleaned by the cleaner 105, and preparation of the image formation of the following color is made. Then, although a Magenta, cyanogen, and a black toner image are formed similarly, then, the development section 103 makes each development counter used according to a color counter a photo conductor, and is changed into the condition in which development is possible. The path of an imprint drum has sufficient magnitude so that the longest form may be twisted and exchange of a development counter may meet the

deadline between the images of each color.

[0006] The exposure of the laser beam 110 for the image formation of each color is performed by taking timing so that the toner image of each color on a photo conductor and the toner image already imprinted by the form of imprint drum lifting may agree in location and may counter along with rotation. Thus, the toner image of four colors is imprinted in piles by the form on the imprint drum 104, and a color image is formed on a form. After the toner image of all colors is imprinted, it is removed from the imprint drum 104 by the exfoliation pawl 114, a fixing assembly 116 is fixed to the upper toner image through the conveyance section 115, and a form is discharged out of equipment. The above is easy explanation of the configuration of the conventional example, and actuation.

[0007] On the other hand, there is JP,1-250970,A as an example of the color picture formation equipment using a continuation imprint method. In this example, the form with which four image formation stations where each included the photo conductor, the light-scanning means, etc. for the image formation of four colors were conveyed by the list and the belt passes the lower part of each photo conductor, and a toner image piles up. The method of this being put in block at the end in piles, and once moving each color toner image by which sequential formation is carried out on a photo conductor considering the toner image of a different color on imprint material as other approaches of forming a color image in piles on middle imprint material, further again at imprint material is indicated by JP,2-212867,A.

[0008]

[Problem(s) to be Solved by the Invention] Among the above conventional examples, by the imprint drum method, in order to double and pile up the location of the toner image of a different color, the imprint drum is used. The mutual location of each color toner image in the case of forming a color image is made to agree by rotating this imprint drum at this rate to a photo conductor, and doubling the timing at the tip of an image further. However, in the above configurations, since it was necessary to twist a form around an imprint drum, since the structure was very complicated, equipment became large-scale required, more than magnitude with the fixed path of an imprint drum. Moreover, since forms with the strong waist, such as a postcard and pasteboard, were not able to be twisted around an imprint drum, they were unusable.

[0009] On the other hand, although the imprint drum was unnecessary in order for what is necessary to be to have the image formation location corresponding to the color number, and just to pass a form there one after another, two or more latent-image means forming, such as a laser beam study system for forming a latent image on a photo conductor in this case, was need corresponding to the number of colors, structure was very complicated and the continuation imprint method became expensive. Since there were two or more image formation locations, the relative physical relationship of the image formation section of each color influenced color gap greatly further again. Alignment between each color of the latent image especially by latent-image means forming needed to be performed correctly, and there was a trouble that a considerable device and a complicated configuration were required for the image exposure system which is latent-image means forming as shown also in JP,1-250970,A.

[0010] the purpose of this invention -- the above-mentioned trouble -- taking an example -- the configuration of the middle imprint section -- small -- it is simple and is in offering the individual unit used for the good outstanding color picture recording device of maintenance nature.

[0011]

[Means for Solving the Problem] The individual unit of this invention carries out set arrangement in a revolving shaft and the perpendicularly removable condition respectively at the shape of an approximate circle column, and two or more individual units which have opening which supplies the color toner held in the interior to the unit exterior are constituted. And while said opening stops in the condition of being located in the side, in a development location and said opening stops in the condition of being located up, in an exchange location The body of revolution which constituted said individual unit from the closing motion section on the top face of equipment for said opening removable to the shaft and perpendicular direction of said body of revolution in the condition of having turned up, A means by which it is established after imprinting the image formed on the photo conductor with said color toner on the middle imprint object held in the middle imprint unit and imprinting it in a record form further, While being located in said body-of-revolution upper part and laying the record form after color picture fixing The recording paper installation base which makes the closing motion section for individual unit exchange serve a double purpose, and the middle imprint unit hold section held in the revolving shaft and perpendicular direction of said photo conductor possible [a drawer] while arranging said middle

imprint unit in an imprint location, It is located ahead [equipment] and is the closing motion section which can be inserted in said photo conductor revolving shaft and perpendicular direction from said middle imprint unit hold section at a cash drawer or said middle imprint unit hold section about said whole middle imprint unit. The closing motion section which opened a part of record form transit path wide, and was constituted possible [removal of a paper jam] at the time of an open beam is provided. Said middle imprint unit Estranged from said photo conductor to said photo conductor revolving shaft and perpendicular direction, and consisted of the closing motion sections of said front face of equipment removable. The individual unit characterized by being constituted by said body of revolution free [attachment and detachment] where it is the individual unit used for a color picture recording device, it held the color toner in the interior and said opening is turned up. thereby -- small -- it can be simple, the color picture recording device which has the good individual unit of maintenance nature can be obtained, and, moreover, individual unit exchange etc. can be worked easily.

[0012]

[Embodiment of the Invention] The color picture recording device of the 1st mode which uses the individual unit of this invention An image formation means to form a color picture on a photo conductor, and two or more rollers which support the middle imprint belt which opposite arrangement is carried out with said photo conductor, and imprints the color picture of each color one by one from said photo conductor, and said middle imprint belt are held. The body of equipment, the middle imprint belt unit constituted free [attachment and detachment], and an imprint means to imprint a color picture in a record form from said imprint belt after imprinting the color picture of all colors from said photo conductor to said middle imprint belt, A fixing means by which a color picture is fixed to the record form after said imprint termination, and the middle imprint belt unit hold section held in the revolving shaft and perpendicular direction of said photo conductor possible [a drawer] while fixing said middle imprint belt unit to an imprint location, It considered as the configuration which is located ahead [equipment], and pulls out said whole middle imprint belt unit from said middle imprint belt unit hold section to said photo conductor revolving shaft and perpendicular direction, or possesses the closing motion section which can be inserted in said middle imprint belt unit hold section. An image formation means by which the color picture recording device of the 2nd mode of this invention forms a color picture on a photo conductor, The middle imprint belt unit which held two or more rollers which support the middle imprint belt which opposite arrangement is carried out with said photo conductor, and imprints the color picture of each color one by one from said photo conductor, and said middle imprint belt, and was prepared free [the body of equipment, and attachment and detachment], An imprint means to imprint a color picture in a record form from said imprint belt after imprinting the color picture of all colors from said photo conductor to said middle imprint belt, A fixing means by which a color picture is fixed to the record form after said imprint termination, and the middle imprint belt unit hold section which holds said middle imprint belt unit free [attachment and detachment] while fixing to an imprint location, It was located ahead [equipment], a cash drawer and the closing motion section to insert were provided for said middle imprint belt unit, and said whole middle imprint belt unit was considered as the configuration in which a cash drawer and insertion are possible from said closing motion section to said photo conductor revolving shaft and perpendicular direction. the 3rd voice of this invention -- a color-picture recording apparatus [like] -- the 1st mode or the 2nd voice -- it set like, said closing-motion section was the single closing-motion section combining and [for paper jam removal / closing-motion], and the closing-motion section for middle imprint belt unit exchange, and when it opens, it carried out as the configuration of which the imprint roller pair which is locate in a record form transit path and constitutes an imprint means estranges and cancels. An image formation means by which color record of the 4th mode of this invention forms a color picture on a photo conductor, Two or more rollers which support the middle imprint belt which counters with said photo conductor, is arranged and imprints the color picture of each color one by one from said photo conductor, and said middle imprint belt are held. The middle imprint belt unit constituted free [the body of equipment to the cash-drawer possibility of and attachment and detachment] to said photo conductor revolving shaft and perpendicular direction, An imprint means to imprint a color picture in a record form from said middle imprint object after imprinting the color picture of all colors on said middle imprint object from said photo conductor, It considered as the configuration possessing a fixing means by which a color picture is fixed to the record form after said imprint termination, and the closing motion section which are opened and closed in case it is located in the front face of the body of equipment, and said middle imprint belt unit is removed from said hold section or it equips with it. Said closing motion section considered the

color picture recording apparatus of the 5th mode of this invention as the configuration possessing being the single closing motion section combining and [for paper jam removal / closing motion], and the closing motion section for middle imprint belt unit exchange. An image formation means by which the color picture recording device of the 6th mode of this invention forms a color picture on a photo conductor, Two or more rollers which support the middle imprint belt which counters with said photo conductor, is arranged and imprints the color picture of each color one by one from said photo conductor, and said middle imprint belt are held. The middle imprint belt unit constituted free [the body of equipment to the cash-drawer possibility of and attachment and detachment] to said photo conductor revolving shaft and perpendicular direction, An imprint means to imprint a color picture in a record form from said imprint belt after imprinting the color picture of all colors from said photo conductor to said middle imprint belt, When it was prepared in the record form after said imprint termination and a color picture was opened in a fixing means by which it is established, and the front face of equipment at it, the recording paper transit path considered as the configuration possessing the closing motion section for said middle imprint unit exchange which was exposed and was constituted possible [removal of the record form which remains]. In either the 4th mode thru/or the 6th mode, the closing motion section considered the color picture recording device of the 7th mode of this invention as the configuration which makes the imprint roller pair which is located in a record form transit path and constitutes an imprint means estrange by opening. The middle imprint belt unit of the 8th mode of this invention is used for the color picture recording device of either the 1st mode thru/or the 7th mode. Moreover, it is good also as following configurations. The color picture recording device of other modes which use the individual unit of this invention Two or more movable image formation units which are equipped with a development means to have the toner with which a color differs from the photo conductor which each rotates at least, respectively, and form the toner image of a color different, respectively on said photo conductor, A single exposure location, the image formation location which consists of single imprint locations, and the image formation unit group which has arranged said two or more image formation units in the shape of a circular ring, A migration means to rotate said whole image formation unit group in order that said single image formation location may carry out the sequential location of each of two or more of said image formation units, An exposure means to generate signal light, and the mirror of a rotation of said image formation unit group which is arranged mostly at the center-of-rotation section, and leads the signal light of said exposure means to said single exposure location, The middle imprint belt which imprints said toner image in said single imprint location, and piles up and forms a color toner image after exposing said signal light to the photo conductor of the image formation unit located in said image formation location and developing negatives with a toner, A 2nd imprint means to imprint the color toner image on said middle imprint object on a television sheet, It is a color picture recording apparatus with a fixing means by which the toner image imprinted on said television sheet is established. Said middle imprint belt, The cleaner which cleans the toner of said middle imprint belt constitutes a middle imprint belt unit, and it considers as the configuration whose path of insertion from the color picture recording device case of said middle imprint belt unit is a revolving-shaft perpendicular direction of said photo conductor of said image formation unit. Middle of other modes of this invention Two or more movable image formation units which an imprint belt unit is equipped with a development means to have the toner with which a color differs from the photo conductor which each rotates at least, respectively, and form the toner image of a color different, respectively on said photo conductor, A single exposure location, the image formation location which consists of single imprint locations, and the image formation unit group which has arranged said two or more image formation units in the shape of a circular ring, A migration means to rotate said whole image formation unit group in order that said single image formation location may carry out the sequential location of each of two or more of said image formation units, An exposure means to generate signal light, and the mirror of a rotation of said image formation unit group which is arranged mostly at the center-of-rotation section, and leads the signal light of said exposure means to said single exposure location, The middle imprint belt which imprints said toner image in said single imprint location, and piles up and forms a color toner image after exposing said signal light to the photo conductor of the image formation unit located in said image formation location and developing negatives with a toner, The belt cleaner which cleans said middle imprint belt, and the waste toner reservoir which collects and sets the waste toner which cleaned said middle imprint belt and were collected, A 2nd imprint means to imprint the color toner image on said middle imprint object on a television sheet, It is equipment used for the color picture recording apparatus which has a fixing means by which the toner image imprinted on said television sheet is established.

Said middle imprint belt, The belt cleaner which cleans the toner of said middle imprint belt, and said waste toner reservoir constitute a unit, and consider as a removable configuration from a color picture recording device case to a revolving-shaft perpendicular direction to said photo conductor of said image formation unit.

[0013] About the configuration of the above-mentioned color picture recording device, it is explained using drawing 1, using color electrophotography equipment as an example. In drawing 1, 1 is the exterior chassis of a color electro photographic printer, and a drawing right end side is a front face. 1A is a front-face plate of a printer, and this front plate is toppled like a two-dot chain line display to the exterior chassis 1 of a printer focusing on hinge 1B by the side of the lower side, and is lifting closing actuation freedom like aperture actuation and a continuous-line display. The printer interior check maintenance at the time of attachment-and-detachment actuation and the paper jam of the middle imprint belt unit [/ in a printer] 2 etc. is performed by pushing down and opening front plate 1A and opening the interior of a printer greatly. Attachment-and-detachment actuation of this middle imprint belt unit 2 is designed so that it may become perpendicularly to the revolving shaft of a photo conductor.

[0014] The configuration of the middle imprint belt unit 2 is shown in drawing 2. The middle imprint belt unit 2 to unit housing 2a The middle imprint belt 3, the 1st imprint roller 4 which consists of a conductive elastic body, the 2nd imprint roller 5 which consists of an aluminum roller, the tension roller 6 which adjusts the tension of the middle imprint belt 3, the cleaning roller 7 which cleans the toner image which remained on the middle imprint belt 3, It is the thing to which it comes to carry out the endocyst of the waste toner reservoirs 9a and 9b which collect the scraper 8 which fails to scratch the toner collected on the cleaning roller 7, and the collected toners, and the position transducer 10 which detects the location of an imprint belt. In drawing 1, front-face plate of printer 1A can be pushed down like a two-dot chain line, can be opened, and it can detach and attach freely to the predetermined stowage in the printer exterior chassis 1.

[0015] The middle imprint belt 3 consists of a film which used the semi-conductive urethane of the shape of an endless belt with a thickness of 100 micrometers as the base material, and is movable in winding and the direction of an arrow head at the 1st imprint roller 4 and the 2nd imprint roller 5 which fabricated the urethane foam which carried out low resistance processing to the perimeter. die length (52mm) a little with the perimeter of the middle imprint belt 3 longer here than the one half of the perimeter of the photo conductor drum (diameter of 30mm) later mentioned to the die length (298mm) of the longitudinal direction of A4 form which is the maximum paper size -- a guide peg -- it is set as 350mm the bottom.

[0016] Moreover, when it has resistance of 107-ohmcm and the body of a printer is equipped, the pressure welding of the conductive 1st imprint roller 4 is carried out to a photo conductor by the 1.0kg force through the middle imprint belt 3. the 2nd imprint roller 5 -- the middle imprint belt 3 -- minding -- the above-mentioned 1st imprint roller 4 and the same 3rd imprint roller 35 (it illustrates to drawing 1) of a configuration -- a follower -- the pressure welding is carried out lightly pivotable. Furthermore, a cleaning roller 7 is a roller of the belt-cleaner section which cleans the middle imprint belt 3. This is the configuration of impressing the alternating voltage which attracts a toner electrostatic to a metallic roller.

[0017] Drawing 3 is the perspective view showing the configuration of the position transducer 10 formed in the interior of the middle imprint belt unit 2. There is a location detection hole 11 in the edge of the middle imprint belt 3, and a position transducer 10 is the configuration of performing alignment of the color image on the middle imprint belt 3, by detecting passage of the location detection hole 11 optically.

[0018] Again, it returns to drawing 1. Image formation unit 12Bk which carried out black, cyanogen, a Magenta, and 4 sets of fanning for each colors of Hierro in the center of a printer, and 12Y, 12M and 12C constitute the image formation unit group 13, and as shown in drawing, they are arranged in the shape of a circular ring. Each image formation unit can open printer top-face plate 1C of drawing 1 focusing on hinge 1D, and it can be freely detached and attached to the position of the image formation unit group 13. By being equipped in a printer at normal, the mechanical drive network by the side of both by the side of an image formation unit and a printer and an electrical circuit network join together through a mutual coupling member (un-illustrating), and unify the image formation unit 12 mechanically and electrically.

[0019] Image formation unit 12Bk arranged in the shape of a circular ring, and 12C, 12M and 12Y are supported by the base material (not shown), they are driven on the migration motor 14 which is a

migration means as a whole, and the rotation of them is attained around the cylinder-like shaft 15 which is fixed and does not rotate. Each image formation unit can be located in the image formation location 16 which counteracted the 2nd imprint roller 4 which supports the above-mentioned middle imprint belt 3 one by one. The image formation location 16 is also an exposure location by the laser signal light 17. [0020] Since each image formation unit consists of the respectively same configuration member except for the developer put into inside, it explains image formation unit 12Bk for black in order to simplify explanation, and omits about other colors. In addition, when it is necessary to give the same sign to the same part and distinction of the configuration of each color needs to be attached about each object for colors, the alphabetic character which shows each color is given to a sign. drawing 4 -- the object for black -- image formation unit 12Bk is shown in a detail. Although artificers use here the developing-negatives method indicated to Japanese Patent Application No. No. 50274 [four to], if it is the developing-negatives method used for the usual xerography, it cannot be overemphasized that what kind of thing may be used. In drawing 4 , the exposure aperture to which, as for the organic photo conductor with which 18 distributed the phthalocyanine to polycarbonate system binder resin, the magnet with which 19 was fixed on a photo conductor 18 and the same axle, and not rotating, the electrification roller with which 20 is charged in minus in a photo conductor 18, and 17, a laser beam advances into laser beam scan light (laser signal light), and 21 advances into an image formation unit, and 22 are developer hoppers. Ferrite carrier 23Bk with a particle size of 50 micrometers which carried out the coat of the front face to the developer hopper 22 with silicon resin, and 2 component developer 25Bk which mixed toner 24Bk which distributed black colors to polyester resin are put in, and it is made to adhere to photo conductor 18 front face by the magnetism of a magnet 19. The recovery electrode roller made from aluminum with pivotable 26, the magnet with which 27 was fixed to the interior on the same axle and not rotating, the alternating current high voltage power supply to which 28 impresses an electrical potential difference to the recovery electrode roller 26, and 29 are scrapers made from polyphenylene sulfide which fail to scratch the toner on the recovery electrode roller 26. The diameter of a photo conductor 18 is 30mm, and it is made to rotate in the direction of an arrow head by peripheral-speed 60 mm/s, and the recovery electrode roller 26 is 16mm in diameter, and was rotated in the direction of an arrow head by peripheral-speed 60 mm/s. 30 is a cleaner which cleans the toner which remained in the photo conductor front face after an imprint.

[0021] Return explanation is given again at drawing 1 . 31 is the laser beam scanner section (laser aligner) arranged in the bottom in the printer exterior chassis 1, and consists of semiconductor laser and scanner motor 31a, polygon mirror 31b, lens system 31c, etc. The laser signal light 17 corresponding to the time series electrical-and-electric-equipment pixel signal of the image information from this scanner section 31 passes along the optical-path window 32 constituted between image formation unit 12Bk(s) and 12Y of drawing 1 . Incidence is carried out to the mirror 34 to which it was fixed within the shaft 15 through the aperture 33 which was able to be opened in some shafts 15. It advances almost horizontally in image formation unit 12Bk from the exposure aperture 21 of image formation unit 12Bk which is reflected and is in the image formation location 16. Incidence is carried out to the exposure section of the left lateral of a photo conductor 18 through the path between the developer hoppers 22 and cleaners 30 which are arranged up and down in the image formation unit, and scan exposure of the 18th page of the photo conductor is carried out in the direction of a bus-bar.

[0022] Since the optical path from the optical-path window 32 to a mirror 34 uses the clearance between the units of neighboring image formation unit 12Bk(s) and 12Y, it can lose most space which becomes useless in the image formation unit group 13 here. Moreover, since the mirror 34 is formed in the center section of the image formation unit group 13, it can be constituted from a fixed single mirror and is a configuration with simply easy alignment etc.

[0023] 35 is the 3rd imprint roller arranged inside front-face plate of printer 1A, and the form conveyance way is formed in the nip section of the middle imprint belt 3 and the 3rd imprint roller 35 by which the pressure welding was carried out so that a form may be sent with the paper feed roller 36 formed in the lower part of front-face plate of printer 1A. 37 is the sheet paper cassette which the method of outside was made to project and was prepared in the lower side side of front-face plate of printer 1A, and can set two or more papers S to coincidence. A paper conveyance timing roller, the fixing roller pair which prepared 38a and 38b in 39a, and prepared 39b in the inside upper part of a printer, The paper guide plate which prepared 40 between the 3rd imprint roller 35, fixing roller pair 39a, and 39b, The paper discharge roller pair which arranged 41a and 41b in the paper outlet side of fixing roller pair 39a and 39b, the fixing oil reservoir which accumulates the silicone oil 43 which

supplies 42 to fixing roller 39a, and 44 are oil feed rollers which apply a silicone oil 43 to fixing roller 39a.

[0024] By the configuration of the electrophotography equipment of above-mentioned this invention, since the unitization of the middle imprint belt section of a complicated configuration was carried out, when a middle imprint belt deteriorates, a user is enabled to exchange the whole unit and it becomes what was excellent also in maintenance nature. Furthermore, although the location of a belt cleaner and a middle imprint belt tends to shift and it was easy to become the cause of poor cleaning when it was made the configuration which equips a body side with a belt cleaner and exchanges only a middle imprint belt, for the configuration exchange for one by carrying out a middle imprint belt and a cleaner in this invention, the location of a cleaner and a middle imprint belt can be fixed and generating of poor cleaning can be prevented. Moreover, since unitization of the waste toner reservoir of the waste toner which comes out when the middle imprint belt section and a middle imprint belt are cleaned was carried out, it becomes possible to throw away by exchanging processing of a waste toner the whole unit, and it does not soil a user's hand at the time of a maintenance. If a middle imprint belt unit is made the configuration pulled out to the revolving shaft and horizontal direction (space near side of drawing 1) of a photo conductor further again, since the imprint belt 3 and a photo conductor 18 will be rubbed at the time of attachment and detachment of a unit, A photo conductor is not damaged without rubbing a middle imprint belt and a photo conductor by having made it the configuration which a blemish tended to attach to a photo conductor and which pulls out a middle imprint belt unit in this invention to a photo conductor revolving shaft and a perpendicular direction (the direction of the drawing diagonal right of drawing 1). In addition, if a middle imprint belt unit is made the configuration pulled out from the front-face side of a printer like this invention, the attachment-and-detachment configuration of a middle imprint belt unit and the configuration for removing the paper at the time of the paper jam of a printer will be made to the same configuration, and equipment will become simple.

[0025] Hereafter, actuation of the color electrophotography equipment of one example of this invention is explained, referring to drawing 1 and drawing 4. First, actuation of an image formation unit is explained using drawing 4. With the electrification roller 20, the photo conductor 18 was electrified in -500V. The laser beam scan light (laser signal light) 17 was irradiated, and the electrostatic latent image was formed in this photo conductor 18. At this time, the exposure potential of a photo conductor 18 was -100V. 2 component developer 25Bk was made to adhere by magnetism within the developer hopper 22 on this photo conductor 18 front face. Next, the recovery electrode roller 26 front was passed for photo conductor 18 front face. At the time of passage of the non-charged region of a photo conductor 18, the alternating voltage (square wave with a frequency of 3kHz) of 750V0-p (peak two peak 1.5kV) which superimposed the direct current voltage of +100V was impressed to the recovery electrode roller 26 by the alternating current high voltage power supply 28. Then, at the time of passage of photo conductor 18 front face where it was charged in -500V and the electrostatic latent image was written in, the alternating voltage (square wave with a frequency of 3kHz) of 750V0-p (peak two peak 1.5kV) which superimposed the direct current voltage of -300V was impressed to the recovery electrode roller 26 by the alternating current high voltage power supply 28. Then, ** and O ** toners were collected by the developer and non-image part on a photo conductor 18 at the recovery electrode roller 26, and the toner image which carried out NEGAPOJI reversal remained only in the image section on the photo conductor 18. the developer and toner adhering to the recovery electrode roller 26 which rotates in the direction of an arrow head -- a scraper 29 -- scraping -- it returned in the developer hopper 22 again, and used for the next image formation. In this way, the black toner image was obtained on the photo conductor 18. Actuation with the same said of other development counters 12C, 12M, and 12Y other than black was performed.

[0026] Next, the actuation at the time of the color image formation of the equipment of drawing 1 is explained. At first, the image formation unit group 13 is in the location shown in drawing 1, and black image formation unit 12Bk is in the image formation location 16 like illustration. At this time, the photo conductor 18 has countered the 1st imprint roller 4 through the middle imprint belt 3. A black signal light is inputted into image formation unit 12Bk by the laser aligner (laser beam scanner section) 31 according to the image formation process of the image formation unit explained previously, and image formation by the black toner is performed. At this time, the rate (equal to the peripheral speed of a photo conductor) of the image formation of image formation unit 12Bk and the passing speed of the middle imprint belt 3 are set up so that it may become the same, it is an operation of the 1st imprint roller 4, and a black toner image is imprinted by the middle imprint belt 3 at image formation and coincidence.

Immediately after all black toner images finish imprinting, the image formation unit group 13 whole drives image formation unit group 12Bk, and 12C, 12M and 12Y on the migration motor 14, they rotate in the direction of an arrow head of drawing 1 in one, and stop at the location where it rotated 90 degrees exactly and image formation unit 12C arrived at the image formation location 16. Since section E of toner hoppers 22 other than the photo conductor of an image formation unit (developer hopper) or a cleaner 30 (refer to drawing 4) is located inside the rotation radii at photo conductor 18 tip in the meantime, the middle imprint belt 3 does not contact an image formation unit. Like the front after image formation unit 12C's arriving at the image formation location 16, shortly, the laser aligner 31 inputs signal light into image formation unit 12C by the signal of cyanogen, and formation and an imprint of cyanogen of a toner image are performed. At this time, the middle imprint belt 3 rotates one time, and based on the signal from the position transducer 10 shown in drawing 2, the write-in timing of the signal light of cyanogen is controlled so that the toner image of the following cyanogen agrees in location in the toner image of the black imprinted before. In the meantime, the 3rd imprint roller 35 and the cleaning roller 7 (drawing 2) are separated from the middle imprint belt 3 for a while, and they are constituted so that the toner image on an imprint belt may not be disturbed. The same actuation as the above was performed also about a Magenta and Hierro, the toner image of four colors agreed in location on the middle imprint belt 3, it piled up, and the color image was formed. The package imprint of the toner image of four colors was carried out in the operation of the 3rd imprint roller 35 after the imprint of the last Hierro toner image at the form which doubles timing and is sent from a sheet paper cassette 37. Fixing roller pair 39a and 39b were fixed to the toner image by which the form NO imprint was carried out. The form was discharged out of equipment through discharge roller pair 41a and 41b after that. The toner of the imprint remainder which remained on the middle imprint belt 3 was cleaned in the operation of the cleaner roller 7, and the next image formation was equipped with it. Next, the actuation at the time of monochrome mode is explained. The image formation unit of a predetermined color is first moved to an image formation location at the time of monochrome mode. Next, the image formation of a predetermined color and the imprint to the middle imprint belt 3 are performed like a front, and it imprints in the form shortly sent from a sheet paper cassette 37 with the following 3rd imprint roller 35 continuing as it is after an imprint, and is established as it is.

[0027] Next, explanation about the maintenance of this equipment is given. The developer of a specific color is consumed and the case where it maintains is assumed. First, the image formation unit group 13 is rotated according to an operation of the migration motor 14, and the image formation unit of the color of attention is moved to an up location (location of image formation unit 12C of drawing 1). And covering (printer top-face plate 1C) located in the upper part of an equipment body is opened, and the image formation unit of attention is taken out out of equipment from there. Next, it equips with the new image formation unit which adjusted image concentration beforehand. Thereby, after image formation unit wearing can start image formation, without adjusting in any way. The middle imprint belt 3 becomes a life by 30,000 pages about. The waste toner which collected by this time is accumulated in the waste toner reservoirs 9a and 9b. A user opens covering (front plate 1A) located in the front-face section of the body of equipment, and takes out the middle imprint belt unit 2 from there out of equipment. Next, a cleaner etc. equips with an adjusted new unit as a middle imprint belt unit beforehand. Therefore, after unit wearing can start image formation, without adjusting in any way. In addition, in the above example, although the specific thing was used as structure of an image formation unit, the essence and the operation effectiveness of this invention do not change in the case of the image formation unit of structure using the developing-negatives method conventional otherwise.

[0028]

[Effect of the Invention] the configuration which described this invention above -- a complicated imprint drum -- unnecessary -- a small and simple configuration also with the complicated unnecessary configuration for the alignment of an image exposure system -- the alignment of colors -- exact -- it can carry out -- in addition -- and since unitization of the configuration of the toner image formation section containing a photo conductor or a development counter was carried out and unitization also of the middle imprint belt section was carried out, it is easy and the color-picture recording device which can be miniaturized and uses an individual unit with sufficient maintenance nature can be obtained. Furthermore, with this configuration, it writes in the configuration which pulls out a middle imprint belt unit to the revolving shaft and perpendicular direction of a photo conductor, and a photo conductor and an imprint belt rub at the time of attachment-and-detachment actuation, are set at it, and it does not damage. With this configuration, a middle imprint belt and a waste toner reservoir are really written in a

configuration, and it has the effectiveness that it can exchange without soiling a user's hand at the time of a maintenance further again.

[Translation done.]

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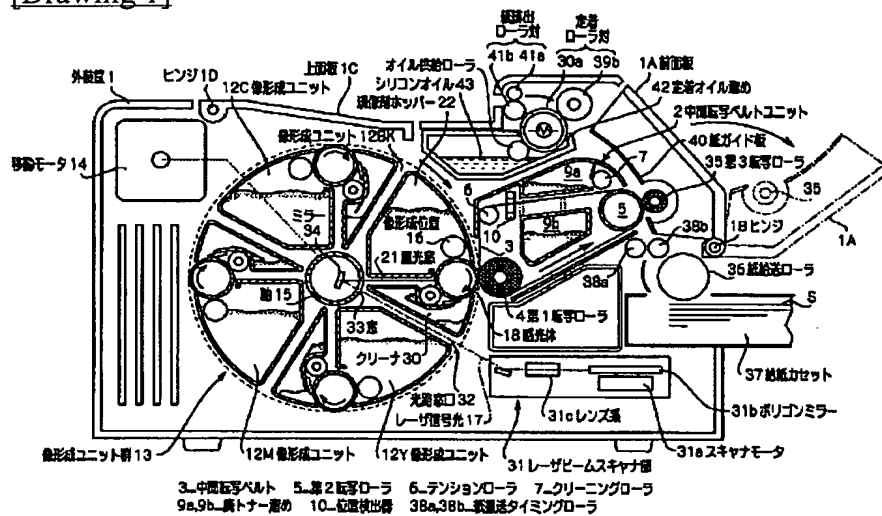
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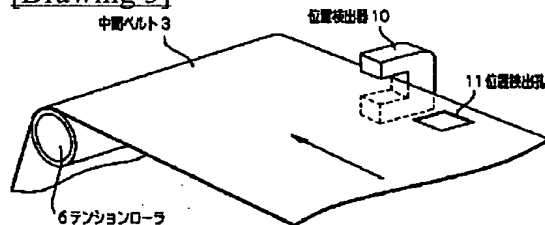
3. In the drawings, any words are not translated.

DRAWINGS

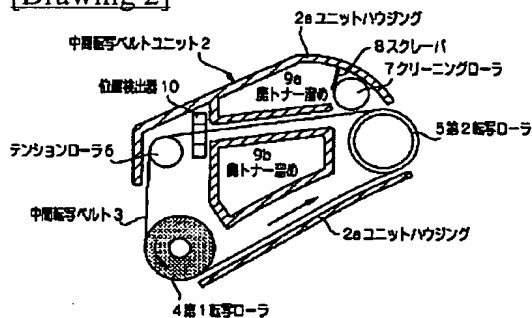
[Drawing 1]



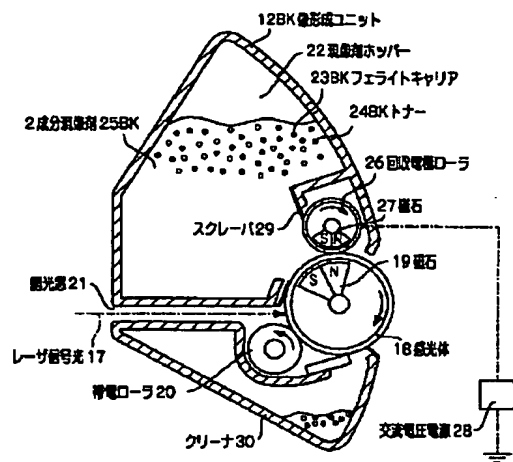
[Drawing 3]



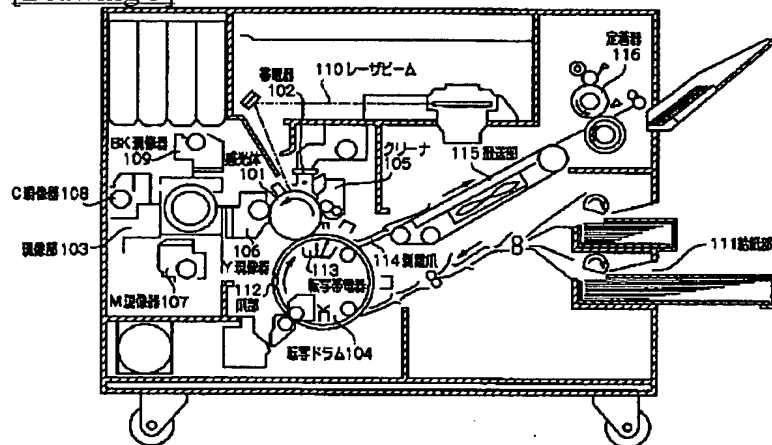
[Drawing 2]



[Drawing 4]



[Drawing 5]



[Translation done.]

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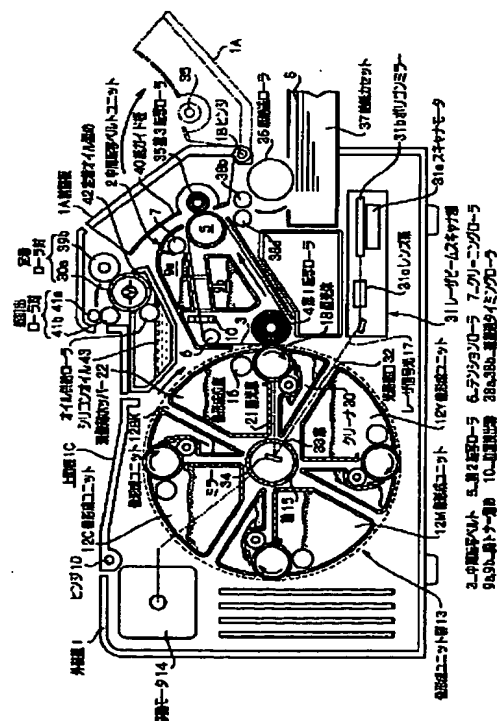
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(54) 【発明の名称】 個別ユニット

(57) 【要約】

【課題】 中間転写部の構成が小型シンプルでメンテナンス性の良い優れたカラー画像記録装置に使用する個別ユニットを提供すること。

【解決手段】 個別ユニットを開口部を上方向に向けた状態で、回転体の軸と垂直方向に、装置上面の開閉部 1 C から着脱可能に構成した回転体と、回転体上方に位置しカラー画像定着後の記録用紙を載置するとともに個別ユニット交換用開閉部を兼用する記録紙載置台とを具備する。中間転写ユニット全体を感光体回転軸と垂直方向に中間転写ユニット収容部から引出し又は挿入可能な開閉部であって、開けたときに記録用紙走行経路の一部を開放し紙ジャムを除去可能に構成された開閉部 1 A を有する。個別ユニットは、内部にカラートナーを収容し、開口部を上方向に向けた状態で回転体に着脱自在に構成される。



【特許請求の範囲】

【請求項 1】 内部に收容されたカラートナーをユニット外部に供給する開口部を有する複数の個別ユニットを各々回転軸と垂直方向に着脱可能な状態で略円柱状に集合配置して構成され、且つ、現像位置において前記開口部が側方に位置する状態で停止する一方、交換位置において前記開口部が上方に位置する状態で停止するとともに、前記個別ユニットを、前記開口部を上方に向けた状態で、前記回転体の軸と垂直方向に、装置上面の開閉部から着脱可能に構成した回転体と、前記カラートナーにより感光体上に形成された画像を、中間転写ユニットに收容された中間転写体に転写し、更に、記録用紙に転写した後に定着する手段と、前記回転体上方に位置し、カラー画像定着後の記録用紙を載置するとともに、個別ユニット交換用開閉部を兼用する記録紙載置台と、前記中間転写ユニットを、転写位置に配置するとともに前記感光体の回転軸と垂直方向に引出可能に收容する中間転写ユニット收容部と、装置前方に位置し、前記中間転写ユニット全体を、前記感光体回転軸と垂直方向に前記中間転写ユニット收容部から引出し又は前記中間転写ユニット收容部に挿入可能な開閉部であつて、開けたときに記録用紙走行経路の一部を開放し紙ジャム除去可能に構成された開閉部と、を具備し、前記中間転写ユニットは、前記感光体回転軸と垂直方向に前記感光体から離間して、前記装置前面の開閉部から着脱可能に構成された、カラー画像記録装置、に使用する個別ユニットであつて、内部にカラートナーを收容し、前記開口部を上方に向けた状態で前記回転体に着脱自在に構成されたことを特徴とする個別ユニット。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、カラープリンタ、カラー複写機やカラーファックス等に応用できるカラー画像記録装置に用いる個別ユニットに関するものである。

【0002】

【従来の技術】 一般に電子写真でカラー画像を形成するためには、イエロ、マゼンタ、シアン、黒の各色のトナー像を転写材上で重ね合わせてカラー像を形成する方法がとられている。このカラー像の形成方法としては、単一の感光体上に順次各色のトナー像を形成し、転写ドラムに巻き付けた転写材を回転させて繰り返しこの感光体に対向させ、そこで順次形成される各色のトナー像を重ねて転写していく転写ドラム方式と、複数の像形成部を並べて配置しベルトなどで搬送される転写材にそれぞれの像形成部の位置を通過させて順次各色のトナー像を転写して重ねていく連続重ね方式が一般的である。

【0003】 前者の転写ドラム方式を用いたものに、特開平 1-252982号公報に示されるカラー画像形成装置がある。図 5 は上記転写ドラム方式の従来例の全体構成の概要を示すものであり、以下その構成と動作を簡単に説明する。図 5 において、101 は感光体で、これに対向して帯電器 102 と現像部 103 と転写ドラム 104 とクリーナ 105 が設けられている。現像部 103 は、イエロ色のトナー像をつくるための Y 現像器 106 とマゼンタ色のための M 現像器 107 とシアン色のための C 現像器 108 と黒色のための Bk 現像器 109 とで構成され、現像器群全体が回転して各々の現像器が順次感光体 101 に対向して現像可能の状態になる。転写ドラム 104 と感光体 101 は、動作中は対向しながらそれぞれ矢印方向に一定速度で回転している。

【0004】 まず、動作が開始すると感光体 101 が矢印方向に回転するとともに、その表面が帯電器 102 によって一様に帯電される。その後、感光体 101 表面は、1 色目のイエロの像を形成するための信号で変調されたレーザビーム 110 を照射されて、潜像が形成される。さらにこの潜像は最初に感光体に対向しているイエロの Y 現像器 106 に現像されて、イエロのトナー像が形成される。形成されたイエロのトナー像が転写ドラム 104 に対向する位置にくるときまでに、すでに転写ドラム 104 の外周には給紙部 111 から送られた転写材としての 1 枚の用紙が先端を爪部 112 でつかまれて巻き付けられており、その用紙の所定の位置に感光体上のイエロのトナー像が対向して出会うようにタイミングがとられてトナー像は形成される。

【0005】 感光体上のイエロのトナー像が転写帯電器 113 の作用により用紙に転写された後、感光体表面はクリーナ 105 により清掃されて、次の色の像形成の準備がなされる。続いてマゼンタ、シアン、黒のトナー像も同様に形成されるが、そのとき現像部 103 は色に応じて用いる各現像器を感光体に対向させて現像可能の状態にする。転写ドラムの径は最長の用紙が巻き付けられ、かつ各色の像間で現像器の交換が間に合うように充分の大きさを持っている。

【0006】 各色の像形成のためのレーザビーム 110 の照射は、回転につれて感光体上の各色のトナー像と転写ドラム上の用紙に既に転写されたトナー像とが位置的に合致されて対向するようにタイミングがとられて行われる。このようにして 4 色のトナー像が転写ドラム 104 上で用紙に重ねて転写されて、用紙上にカラー像が形成される。すべての色のトナー像が転写された後、用紙は剥離爪 114 により転写ドラム 104 から剥かれて、搬送部 115 を経て定着器 116 により上のトナー像が定着され、装置外へ排出される。以上が従来例の構成と動作の簡単な説明である。

【0007】 一方、連続転写方式を用いたカラー画像形成装置の例としては特開平 1-250970号公報がある。この例では 4 色の像形成のためにそれぞれが感光体、光走

査手段などを含んだ4つの像形成ステーションが並び、ベルトに搬送された用紙がそれぞれの感光体の下部を通過してトナー像が重ね合わされる。さらにまた、転写材上に異なる色のトナー像を重ねてカラー像を形成する他の方法として、感光体上に順次形成される各色トナー像を中間転写材上に一旦重ねて、これを最後に一括して転写材に移す方法が特開平2-212867号公報で開示されている。

【0008】

【発明が解決しようとする課題】 以上のような従来例のうち転写ドラム方式では、異なる色のトナー像の位置を合わせて重ねるために転写ドラムを用いている。この転写ドラムを感光体に対して同速度で回転させ、さらに像の先端のタイミングを合わせることによって、カラー像を形成する場合の各色トナー像の相互位置を合致させている。しかしながら上記のような構成においては、転写ドラムに用紙を巻き付ける必要があるため、転写ドラムの径が一定の大きさ以上必要であり、またその構造が非常に複雑なため、装置が大がかりなものとなっていた。

また葉書や厚紙など腰の強い用紙は、転写ドラムに巻き付けることができないため使用不可能であった。

【0009】 一方、連続転写方式は、色数に対応した像形成位置を有しており、そこに用紙を次々と通過させればよい。転写ドラムが不要であるが、この場合には感光体上に潜像を形成するためのレーザ光学系などの潜像形成手段が色の数に対応して複数個必要であり、構造が非常に複雑で高価になった。さらにまた、像形成位置が複数箇所あるため、各色の像形成部の相対的な位置関係が色ズレに大きく影響した。特に潜像形成手段による潜像の各色間の位置合わせを正確に行う必要があり、特開平1-250970号公報にも示されているように、潜像形成手段である像露光系に相当の工夫と複雑な構成が必要であるという問題点があった。

【0010】 本発明の目的は上記問題点を鑑み、中間転写部の構成が小型シンプルでメンテナンス性の良い優れたカラー画像記録装置に用いる個別ユニットを提供することにある。

【0011】

【課題を解決するための手段】 本発明の個別ユニットは、内部に収容されたカラートナーをユニット外部に供給する開口部を有する複数の個別ユニットを各々回転軸と垂直方向に着脱可能な状態で略円柱状に集合配置して構成され、且つ、現像位置において前記開口部が側方に位置する状態で停止する一方、交換位置において前記開口部が上方に位置する状態で停止するとともに、前記個別ユニットを、前記開口部を上方に向けた状態で、前記回転体の軸と垂直方向に、装置上面の開閉部から着脱可能に構成した回転体と、前記カラートナーにより感光体上に形成された画像を、中間転写ユニットに収容された中間転写体に転写し、更に、記録用紙に転写した後に定

着する手段と、前記回転体上方に位置し、カラー画像定着後の記録用紙を載置するとともに、個別ユニット交換用開閉部を兼用する記録紙載置台と、前記中間転写ユニットを、転写位置に配置するとともに前記感光体の回転軸と垂直方向に引出可能に収容する中間転写ユニット収容部と、装置前方に位置し、前記中間転写ユニット全体を、前記感光体回転軸と垂直方向に前記中間転写ユニット収容部から引出し又は前記中間転写ユニット収容部に挿入可能な開閉部であって、開けたときに記録用紙走行経路の一部を開放し紙ジャムを除去可能に構成された開閉部と、を具備し、前記中間転写ユニットは、前記感光体回転軸と垂直方向に前記感光体から離間して、前記装置前面の開閉部から着脱可能に構成された、カラー画像記録装置、に使用する個別ユニットであって、内部にカラートナーを収容し、前記開口部を上方に向けた状態で前記回転体に着脱自在に構成されたことを特徴とする個別ユニット。これにより、小型シンプルでメンテナンス性のよい個別ユニットを有するカラー画像記録装置を得ることができ、しかも、個別ユニット交換等の作業を容易に行うことができる。

【0012】

【発明の実施の形態】 本発明の個別ユニットを使用する第1の態様のカラー画像記録装置は、感光体上にカラー画像を形成する像形成手段と、前記感光体と対向配置され前記感光体から順次各色のカラー画像を転写する中間転写ベルトと前記中間転写ベルトを支持する複数のローラとを収容し、装置本体と着脱自在に構成された中間転写ベルトユニットと、前記感光体から前記中間転写ベルトに全ての色のカラー画像を転写した後に、前記転写ベルトから記録用紙にカラー画像を転写する転写手段と、前記転写終了後の記録用紙にカラー画像を定着する定着手段と、前記中間転写ベルトユニットを、転写位置に固定するとともに前記感光体の回転軸と垂直方向に引出可能に収容する中間転写ベルトユニット収容部と、装置前方に位置し、前記中間転写ベルトユニット全体を、前記感光体回転軸と垂直方向に前記中間転写ベルトユニット収容部から引出し、又は、前記中間転写ベルトユニット収容部に挿入可能な開閉部と、を具備する構成とした。

本発明第2の態様のカラー画像記録装置は、感光体上にカラー画像を形成する像形成手段と、前記感光体と対向配置され前記感光体から順次各色のカラー画像を転写する中間転写ベルトと前記中間転写ベルトを支持する複数のローラとを収容し、装置本体と着脱自在に設けられた中間転写ベルトユニットと、前記感光体から前記中間転写ベルトに全ての色のカラー画像を転写した後に、前記転写ベルトから記録用紙にカラー画像を転写する転写手段と、前記転写終了後の記録用紙にカラー画像を定着する定着手段と、前記中間転写ベルトユニットを、転写位置に固定するとともに着脱自在に収容する中間転写ベルトユニット収容部と、装置前方に位置し、前記中間転写

ベルトユニットを引出し・挿入する開閉部と、を具備し、前記中間転写ベルトユニット全体を、前記感光体回転軸と垂直方向に、前記開閉部から引出し・挿入可能な構成とした。本発明第3の態様のカラー画像記録装置は、第1の態様又は第2の態様において、前記開閉部は、紙ジャム除去のための開閉部と中間転写ベルトユニット交換のための開閉部とを兼用する単一の開閉部であり、開けたときに記録用紙走行経路に位置し転写手段を構成する転写ローラ対を離間・解除する構成とした。本発明第4の態様のカラー記録は、感光体上にカラー画像を形成する像形成手段と、前記感光体と対向して配置され前記感光体から順次各色のカラー画像を転写する中間転写ベルトと前記中間転写ベルトを支持する複数のローラとを収容し、前記感光体回転軸と垂直方向に引出し可能、且つ、装置本体から着脱自在に構成された中間転写ベルトユニットと、前記感光体から前記中間転写体に全ての色のカラー画像を転写した後に、前記中間転写体から記録用紙にカラー画像を転写する転写手段と、前記転写終了後の記録用紙にカラー画像を定着する定着手段と、装置本体前面に位置し、前記中間転写ベルトユニットを前記収容部から外し又は装着する際に開閉する開閉部と、を具備する構成とした。本発明第5の態様のカラー画像記録装置は、前記開閉部は、紙ジャム除去のための開閉部と中間転写ベルトユニット交換のための開閉部とを兼用する単一の開閉部であること、を具備する構成とした。本発明第6の態様のカラー画像記録装置は、感光体上にカラー画像を形成する像形成手段と、前記感光体と対向して配置され前記感光体から順次各色のカラー画像を転写する中間転写ベルトと前記中間転写ベルトを支持する複数のローラとを収容し、前記感光体回転軸と垂直方向に引出し可能、且つ、装置本体から着脱自在に構成された中間転写ベルトユニットと、前記感光体から前記中間転写ベルトに全ての色のカラー画像を転写した後に、前記転写ベルトから記録用紙にカラー画像を転写する転写手段と、前記転写終了後の記録用紙にカラー画像を定着する定着手段と、装置前面に設けられ、開けたときに記録紙走行経路が露出し、残留する記録用紙を除去可能に構成された前記中間転写ユニット交換用の開閉部と、を具備する構成とした。本発明第7の態様のカラー画像記録装置は、第4の態様乃至第6の態様のいずれかにおいて、開閉部は、開けることにより、記録用紙走行経路に位置し転写手段を構成する転写ローラ対を離間させる構成とした。本発明第8の態様の中間転写ベルトユニットは、第1の態様乃至第7の態様のいずれかのカラー画像記録装置に使用する。また、以下のような構成としてもよい。本発明の個別ユニットを使用する他の態様のカラー画像記録装置は、各々が少なくとも回転する感光体とそれぞれ色の異なるトナーを有する現像手段とを備え、前記感光体上にそれぞれ異なった色のトナー像を形成する複数の移動可能な像形成ユニットと、単一の

露光位置と単一の転写位置より構成される像形成位置と、前記複数の像形成ユニットを円環状に配置した像形成ユニット群と、前記複数の像形成ユニットのそれぞれを、前記単一の像形成位置に順次位置せしめるため前記像形成ユニット群全体を回転移動させる移動手段と、信号光を発生する露光手段と、前記像形成ユニット群の回転移動のほぼ回転中心部に配置され、前記露光手段の信号光を前記単一の露光位置に導くミラーと、前記像形成位置に位置する像形成ユニットの感光体に前記信号光を露光し、トナーにより現像した後、前記トナー像を前記単一の転写位置で転写し、カラートナー像を重ね合わせて形成する中間転写ベルトと、前記中間転写体上のカラートナー像を、受像シート上に転写する第2転写手段と、前記受像シート上に転写したトナー像を定着する定着手段とを有するカラー画像記録装置であって、前記中間転写ベルトと、前記中間転写ベルトのトナーをクリーニングするクリーナとが中間転写ベルトユニットを構成し、前記中間転写ベルトユニットのカラー画像記録装置筐体からの着脱方向が前記像形成ユニットの前記感光体の回転軸垂直方向である構成とする。本発明の他の態様の中間転写ベルトユニットは、各々が少なくとも回転する感光体とそれぞれ色の異なるトナーを有する現像手段とを備え、前記感光体上にそれぞれ異なった色のトナー像を形成する複数の移動可能な像形成ユニットと、単一の露光位置と単一の転写位置より構成される像形成位置と、前記複数の像形成ユニットを円環状に配置した像形成ユニット群と、前記複数の像形成ユニットのそれぞれを、前記単一の像形成位置に順次位置せしめるため前記像形成ユニット群全体を回転移動させる移動手段と、信号光を発生する露光手段と、前記像形成ユニット群の回転移動のほぼ回転中心部に配置され、前記露光手段の信号光を前記単一の露光位置に導くミラーと、前記像形成位置に位置する像形成ユニットの感光体に前記信号光を露光し、トナーにより現像した後、前記トナー像を前記単一の転写位置で転写し、カラートナー像を重ね合わせて形成する中間転写ベルトと、前記中間転写ベルトをクリーニングするベルトクリーナと、前記中間転写ベルトをクリーニングし回収された廃トナーを溜めおく廃トナー溜めと、前記中間転写体上のカラートナー像を受像シート上に転写する第2転写手段と、前記受像シート上に転写したトナー像を定着する定着手段とを有するカラー画像記録装置に用いる装置であって、前記中間転写ベルトと、前記中間転写ベルトのトナーをクリーニングするベルトクリーナと、前記廃トナー溜めとがユニットを構成し、カラー画像記録装置筐体から前記像形成ユニットの前記感光体に対し回転軸垂直方向に着脱可能な構成とする。

【0013】上記カラー画像記録装置の構成について、カラー電子写真装置を例として、図1を用いて説明する。図1において、1はカラー電子写真プリンタの外装

筐であり、図面右端面側が前面である。1Aはプリンタ前面板であり、該前面板はプリンタの外装筐1に対して下辺側のヒンジ1Bを中心に二点鎖線表示のように倒し開き操作および実線表示のように起こし閉じ操作自由である。プリンタ内に対する中間転写ベルトユニット2の着脱操作や紙詰まり時などのプリンタ内部点検保守等は前面板1Aを倒し開いてプリンタ内部を大きく開放することにより行われる。この中間転写ベルトユニット2の着脱動作は、感光体の回転軸に対し垂直方向になるように設計されている。

【0014】中間転写ベルトユニット2の構成を図2に示す。中間転写ベルトユニット2はユニットハウジング2aに、中間転写ベルト3、導電性弾性体よりなる第1転写ローラ4、アルミローラよりなる第2転写ローラ5、中間転写ベルト3の張力を調整するテンションローラ6、中間転写ベルト3上に残ったトナー像をクリーニングするクリーニングローラ7、クリーニングローラ7上に回収したトナーを掻き落すスクレーパ8、回収したトナーを溜めておく廃トナー溜め9aおよび9b、転写ベルトの位置を検出する位置検出器10を内包させてなるもので、図1においてプリンタ前面板1Aを二点鎖線のように倒し開いてプリンタ外装筐1内の所定の収納部に対して着脱自在である。

【0015】中間転写ベルト3は、厚さ100 μ mのエンドレスベルト状の半導電性のウレタンを基材としたフィルムよりなり、周囲に低抵抗処理をしたウレタンフォームを成形した第1転写ローラ4および第2転写ローラ5に巻回し、矢印方向に移動可能になっている。ここで、中間転写ベルト3の周長は、最大用紙サイズであるA4用紙の長手方向の長さ(298mm)に、後述する感光体ドラム(直径30mm)の周長の半分より若干長い長さ(52mm)を足した350mmに設定している。

【0016】また、導電性の第1転写ローラ4は $10^7 \Omega \cdot \text{cm}$ の抵抗をもち、プリンタ本体に装着されたときには、中間転写ベルト3を介して感光体に1.0kgの力で圧接される。第2転写ローラ5には、中間転写ベルト3を介して上記の第1転写ローラ4と同様の構成の第3転写ローラ35(図1に図示)が、従動回転可能に軽く圧接している。さらに、クリーニングローラ7は、中間転写ベルト3を清掃するベルトクリーナ部のローラである。これは、金属性のローラにトナーを静電的に吸引する交流電圧を印加する構成である。

【0017】図3は中間転写ベルトユニット2の内部に設けられた位置検出器10の構成を示す斜視図である。中間転写ベルト3の端部には位置検出孔11があり、位置検出器10はその位置検出孔11の通過を光学的に検出することによって、中間転写ベルト3上でのカラー像の位置合わせを行う構成である。

【0018】再び、図1に戻る。プリンタ中央には黒、シアン、マゼンタ、イエロの各色用の4組の扇型をした

像形成ユニット12Bk、12Y、12M、12Cが像形成ユニット群13を構成し、図のように円環状に配置されている。各像形成ユニットは、図1のプリンタ上面板1Cをヒンジ1Dを中心に開いて像形成ユニット群13の所定の位置に着脱自在である。像形成ユニット12はプリンタ内に正規に装着されることにより像形成ユニット側とプリンタ側の両者側の機械的駆動系統、電気回路系統が相互カップリング部材(不図示)を介して結合して機械的、電氣的に一体化する。

10 【0019】円環状に配置されている像形成ユニット12Bk、12C、12M、12Yは支持体(図示せず)に支持されており、全体として移動手段である移動モータ14に駆動され、固定されて回転しない円筒状の軸15の周りに回転移動可能になっている。各像形成ユニットは、順次、前述の中間転写ベルト3を支持する第2転写ローラ4に対向した像形成位置16に位置することができる。像形成位置16はレーザ信号光17による露光位置でもある。

20 【0020】各像形成ユニットは、中に入れる現像剤を除きそれぞれ同じ構成部材よりなるので、説明を簡略化するため黒用の像形成ユニット12Bkについて説明し、他の色については省略する。なお、各色用について、同じ部分には同じ符号を付し、各色の構成の区別をつける必要がある場合は、符号に各色を示す文字を付す。図4に黒用像形成ユニット12Bkを詳細に示す。ここでは、発明者らが特願平4-50274号に開示した現像法を用いているが、通常の電子写真法に用いる現像法であればいかなるものでもよいことは言うまでもない。図4において、18はフタロシアニンをポリカーボネート系バインダ樹脂に分散した有機感光体、19は感光体18と同軸で固定された回転しない磁石、20は感光体18をマイナスに帯電する帯電ローラ、17はレーザビーム走査光(レーザ信号光)、21はレーザビームが像形成ユニットに進入する露光窓、22は現像剤ホッパーである。現像剤ホッパー22には、表面をシリコン樹脂でコートした粒径50 μ mのフェライトキャリア23Bkとポリエステル樹脂に黒顔料を分散したトナー24Bkを混合した2成分現像剤25Bkを入れ、磁石19の磁力により感光体18表面に付着させる。26はアルミニウム製の回転可能な回収電極ローラ、27はその内部に同軸で固定された回転しない磁石、28は回収電極ローラ26に電圧を印加する交流高圧電源、29は回収電極ローラ26上のトナーを掻き落すポリフェニレンサルファイド製のスクレーパである。感光体18の直径は30mmで、周速60mm/sで矢印方向に回転させ、回収電極ローラ26は直径16mmで、周速60mm/sで矢印方向に回転させた。30は転写後の感光体表面に残ったトナーを清掃するクリーナである。

50 【0021】再び図1に戻り説明する。31はプリンタ外装筐1内の下側に配設したレーザビームスキャナ部(レーザ露光装置)であり、半導体レーザ、スキャナモータ31a、ポリゴンミラー31b、レンズ系31c等から構成されて

いる。該スキャナ部31からの画像情報の時系列電気画素信号に対応したレーザ信号光17は図1の像形成ユニット12Bkと12Yの間に構成された光路窓口32を通して、軸15の一部に開けられた窓33を通して軸15内の固定されたミラー34に入射し、反射されて像形成位置16にある像形成ユニット12Bkの露光窓21から像形成ユニット12Bk内にほぼ水平に進入し、像形成ユニット内に上下に配設されている現像剤ホッパー22とクリーナ30との間の通路を通して感光体18の左側面の露光部に入射し、感光体18面が母線方向に走査露光される。

【0022】ここで光路窓口32からミラー34までの光路は両隣の像形成ユニット12Bkと12Yとのユニット間の隙間を利用しているため、像形成ユニット群13には無駄になる空間をほとんどなくすることができる。また、ミラー34は像形成ユニット群13の中央部に設けられているため、固定された単一のミラーで構成することができ、シンプルでかつ位置合わせ等が容易な構成である。

【0023】35はプリンタ前面板1Aの内側に配設した第3転写ローラであり、中間転写ベルト3と第3転写ローラ35との圧接されたニップ部には、プリンタ前面板1Aの下部に設けた紙給送ローラ36により用紙が送られてくるように用紙搬送路が形成されている。37はプリンタ前面板1Aの下辺側に外方に突出させて設けた給紙カセットであり、複数の紙Sを同時にセットできる。38aと38bは紙搬送タイミングローラ、39a、39bはプリンタの内側上部に設けた定着ローラ対、40は第3転写ローラ35と定着ローラ対39a、39b間に設けた紙ガイド板、41a、41bは定着ローラ対39a、39bの紙出口側に配設した紙排出ローラ対、42は定着ローラ39aに供給するシリコンオイル43を溜める定着オイル溜め、44はシリコンオイル43を定着ローラ39aに塗布するオイル供給ローラである。

【0024】上記本発明の電子写真装置の構成によって、複雑な構成の中間転写ベルト部をユニット化できたため、中間転写ベルトが劣化したときにはユーザがユニットごとと交換することが可能になりメンテナンス性も優れたものとなる。さらに、ベルトクリーナを本体側に装着し中間転写ベルトだけを交換する構成にすると、ベルトクリーナと中間転写ベルトとの位置がずれやすく、クリーニング不良の原因になりやすかったが、本発明では中間転写ベルトとクリーナとを一体にして交換する構成のため、クリーナと中間転写ベルトとの位置を固定でき、クリーニング不良の発生を防止できる。また、中間転写ベルト部と中間転写ベルトを清掃したときに出る廃トナーの廃トナー溜めとをユニット化したため、廃トナーの処理をユニットごとと交換することによって捨てることが可能になりメンテナンス時にユーザの手を汚すことがない。さらにまた、中間転写ベルトユニットを感光体の回転軸と水平方向(図1の紙面手前側)に引き出す構成にすると、ユニットの着脱時に転写ベルト3と感光体18とがこすり合わされるため、感光体に傷がつきやすかつ

た、本発明では、中間転写ベルトユニットを感光体回転軸と垂直方向(図1の図面斜め右上方向)に引き出す構成にしたことにより、中間転写ベルトと感光体とがこすり合わされることなく、感光体を傷つけることがない。なお、本発明のように中間転写ベルトユニットをプリンタ前面側から引き出す構成にすると、中間転写ベルトユニットの着脱構成と、プリンタの紙ジャム時の紙を取り去るための構成とを同一構成にでき、装置がシンプルになる。

10 【0025】以下、本発明の一実施例のカラー電子写真装置の動作について、図1と図4とを参照しながら説明する。まず、図4を用いて像形成ユニットの動作を説明する。感光体18を帯電ローラ20で、-500Vに帯電させた。この感光体18にレーザビーム走査光(レーザ信号光)17を照射し静電潜像を形成した。このとき感光体18の露光電位は-100Vであった。この感光体18表面上に、2成分現像剤25Bkを現像剤ホッパー22内で磁力により付着させた。次に感光体18表面を回収電極ローラ26の前を通過させた。感光体18の未帯電域の通過時には、回収電極ローラ26には交流高圧電源28により、+100Vの直流電圧を重畳した750V0-p(ピーク・ツー・ピーク 1.5kV)の交流電圧(周波数3kHzの矩形波)を印加した。その後、-500Vに帯電し静電潜像が書き込まれた感光体18表面の通過時には、回収電極ローラ26には交流高圧電源28により、-300Vの直流電圧を重畳した750V0-p(ピーク・ツー・ピーク 1.5kV)の交流電圧(周波数3kHzの矩形波)を印加した。すると、感光体18上の現像剤と非画像部分に付着したトナーは回収電極ローラ26に回収され、感光体18上には画像部にのみネガポジ反転したトナー像が残った。矢印方向に回転する回収電極ローラ26に付着した現像剤とトナーは、スクレーバ29によって掻き取り、再び現像剤ホッパー22内に戻し次の像形成に用いた。こうして感光体18上には黒色のトナー像が得られた。黒色以外の他の現像剤12C、12M、12Yについても同様の動作を行った。

【0026】次に図1の装置のカラー像形成時の動作を説明する。最初、像形成ユニット群13は図1に示す位置にあり、黒の像形成ユニット12Bkが図示のように像形成位置16にある。このとき感光体18は中間転写ベルト3を介して第1転写ローラ4に対向している。先に説明した像形成ユニットの像形成工程により、レーザ露光装置(レーザビームスキャナ部)31により黒の信号光が像形成ユニット12Bkに入力され、黒トナーによる像形成が行われる。このとき像形成ユニット12Bkの像形成の速度(感光体の周速に等しい)と中間転写ベルト3の移動速度は同一になるように設定されており、像形成と同時に第1転写ローラ4の作用で、黒トナー像が中間転写ベルト3に転写される。黒のトナー像がすべて転写し終わった直後に、像形成ユニット群12Bk、12C、12M、12Yは像形成ユニット群13全体が移動モータ14に駆動されて一

体的に図1の矢印方向に回転移動し、ちょうど90度回転して像形成ユニット12Cが像形成位置16に達した位置で止まる。この間、像形成ユニットの感光体以外のトナーホッパー(現像剤ホッパー)22やクリーナ30(図4参照)の部は感光体18先端の回転円弧より内側に位置しているので、中間転写ベルト3が像形成ユニットに接触することはない。像形成ユニット12Cが像形成位置16に到着後、前と同様に今度はシアン(シアン)の信号でレーザ露光装置31が像形成ユニット12Cに信号光を入力し、シアンのトナー像の形成と転写が行われる。このとき、中間転写ベルト3が1回転してきて、前に転写された黒のトナー像に次のシアンのトナー像が位置的に合致するように、図2に示す位置検出器10からの信号に基づいてシアンの信号光の書き込みタイミングが制御される。この間、第3転写ローラ35とクリーニングローラ7(図2)は中間転写ベルト3から少し離されており、転写ベルト上のトナー像を乱さないように構成されている。上記と同様の動作をマゼンタ、イエロについても行い、中間転写ベルト3上には4色のトナー像が位置的に合致して重ね合わされカラー像が形成された。最後のイエロトナー像の転写後、4色のトナー像はタイミングを合わせて給紙カセット37から送られる用紙に、第3転写ローラ35の作用で一括転写された。用紙/転写されたトナー像は定着ローラ対39a、39bにより定着された。用紙はその後排出ローラ対41a、41bを経て装置外に排出された。中間転写ベルト3上に残った転写残りのトナーは、クリーナローラ7の作用で清掃され次の像形成に備えた。次に単色モード時の動作を説明する。単色モード時は、まず所定の色の像形成ユニットが像形成位置に移動される。次に前と同様に所定の色の像形成と中間転写ベルト3への転写を行い、今度は転写後そのまま続けて、次の第3転写ローラ35により給紙カセット37から送られてくる用紙に転写をし、そのまま定着する。

【0027】次に、この装置のメンテナンスに関する説明をする。特定の色の現像剤が消費され、メンテナンスをする場合を想定する。まず、移動モータ14の作用により像形成ユニット群13を回転して、注目の色の像形成ユニットを上部位置(図1の像形成ユニット12Cの位置)に移動する。そして装置本体上部に位置したカバー(プリンタ上面板1C)をあけて、そこから注目の像形成ユニットを装置外に取り出す。次に、あらかじめ画像濃度を調整した新しい像形成ユニットを装着する。これにより、像形成ユニット装着後は何ら調整することなく像形成が開始できる。中間転写ベルト3はおおよそ3万ページで寿命になる。このときまでに溜った廃トナーは廃トナー溜め9a、9bに溜められる。ユーザは装置本体前面部に位置するカバー(前面板1A)をあけて、そこから中間転写ベルトユニット2を装置外に取り出す。次に、あらかじめ中間転写ベルトユニットとしてクリーナ等が調整済みの新しいユニットを装着する。したがって、ユニ

ット装着後は何ら調整することなく像形成が開始できる。なお、以上の実施例では、像形成ユニットの構造として特定のものをういたが、他にコンベンショナルな現像法を用いた構造の像形成ユニットの場合でも、本発明の本質と作用効果は変わらない。

【0028】

【発明の効果】本発明は上記した構成によって、複雑な転写ドラムが不要で、像露光系の位置合わせのための複雑な構成も不要な、小型でシンプルな構成で色同士の位置合わせが正確に行え、なおかつ感光体や現像器を含むトナー像形成部の構成がユニット化され、また中間転写ベルト部もユニット化されたので、簡単で小型化できかつメンテナンス性の良い、個別ユニットを使用するカラー画像記録装置を得ることができる。さらに本構成では、中間転写ベルトユニットを感光体の回転軸と垂直方向に引き出す構成にしたため、着脱動作時に感光体と転写ベルトとがこすり合わされて傷つけることがない。さらにまた本構成では、中間転写ベルトと廃トナー溜めとを一体構成にしたため、メンテナンス時にユーザの手を汚すことなく交換できるという効果を有する。

【図面の簡単な説明】

【図1】本発明の一実施例におけるカラー電子写真装置の構成図

【図2】本発明の一実施例のカラー電子写真装置に用いられる中間転写ベルトユニットの構成図

【図3】本発明の一実施例のカラー電子写真装置に用いられる中間転写ベルトユニットの位置検出器の構成を示す構成図

【図4】本発明の一実施例のカラー電子写真装置に用いられる像形成ユニットの構成を示す構成図

【図5】従来のカラー電子写真装置の構成図

【符号の説明】

1 外装筐

1A 前面板

1B、1D ヒンジ

1C プリンタ上面板

2 中間転写ベルトユニット

2a ユニットハウジング

3 中間転写ベルト

4 第1転写ローラ

5 第2転写ローラ

6 テンションローラ

7 クリーニングローラ

8 スクレーパー

9a、9b 廃トナー溜め

10 位置検出器

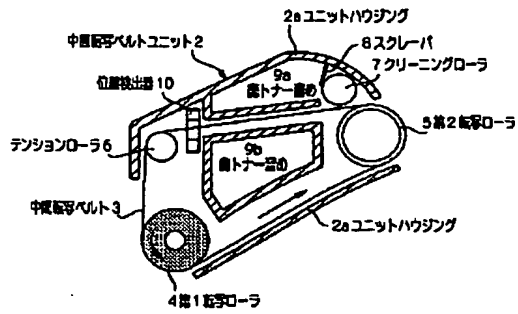
11 位置検出孔

12Bk、12C、12M、12Y 像形成ユニット

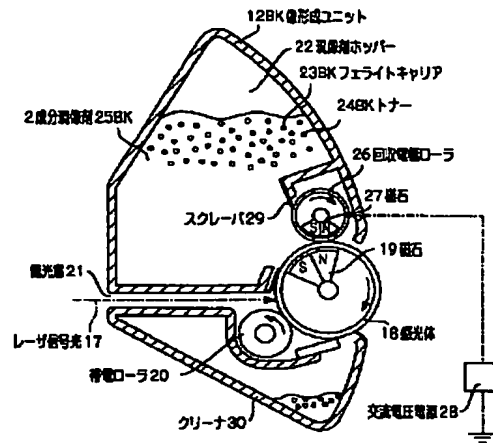
13 像形成ユニット群

14 移動モータ

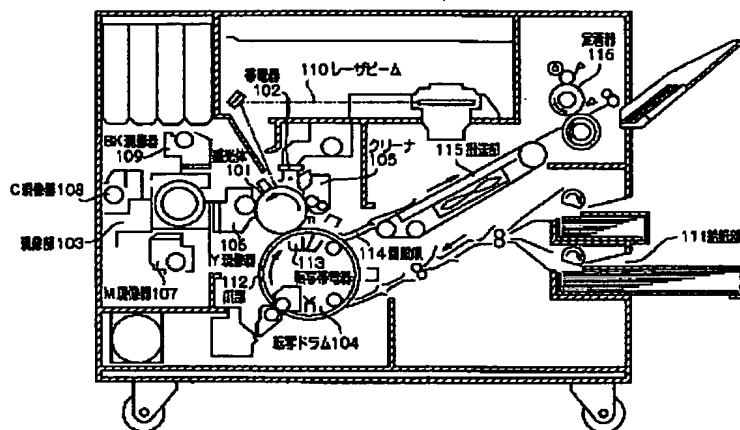
【図2】



【図4】



【図5】



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